

Claims

What is claimed is:

1. A standardized peripheral apparatus comprising:
an integrated circuit;
a case encasing the integrated circuit, the case having a form factor including a plurality of external dimensions in compliance with a standard having a plurality of specifications governing the form factor and the external dimensions but not providing for thermal management arrangement; and
a thermal management arrangement to either modify or augment the case to provide a suitable thermal environment for the integrated circuit without causing the case to cease to comply with the standard's form factor and external dimension specifications.
2. The standardized peripheral apparatus of claim 1, wherein the thermal management arrangement comprises an outlet vent, disposed on a first portion of a first surface of the case, to facilitate an exhaust of heat generated by the integrated circuit into an ambient.
3. The standardized peripheral apparatus of claim 2, wherein the thermal management arrangement further includes an inlet vent disposed on a second portion of a second surface of the case, to facilitate an intake of air from the ambient.

4. The standardized peripheral apparatus of claim 3, wherein the first and second surfaces are of the same surface.
5. The standardized peripheral apparatus of claim 3, wherein the thermal management arrangement further comprises
a flow generating device disposed inside the case using available space, to at least facilitate an air flow over the integrated circuit in a general direction from the inlet vent to the outlet vent.
6. The standardized peripheral apparatus of claim 5, wherein the flow generating device is positioned substantially near the inlet vent.
7. The standardized peripheral apparatus of claim 6, wherein the flow generating device comprises a jet actuator.
8. The standardized peripheral apparatus of claim 7, wherein the jet actuator comprises a selected one of a piezoelectric synthetic jet actuator and an electromagnetic synthetic jet actuator.
9. The standardized peripheral apparatus of claim 7, wherein the jet actuator is approximately between 2-3 mm high.

10. The standardized peripheral apparatus of claim 7, wherein the jet actuator operates on input powers approximately between 10 and 50 milliwatts.

11. The standardized peripheral apparatus of claim 3, wherein the thermal management arrangement further comprises:

at least one partition disposed inside the case using available space to provide a plurality of air flow chambers; and

a flow generating device disposed inside the case using available space to facilitate an air flow over a portion of the integrated circuit.

12. The standardized peripheral apparatus of claim 11, wherein the flow generating device and at least a portion of the integrated circuit are located substantially in a first air flow chamber.

13. The standardized peripheral apparatus of claim 12, wherein

the first air flow chamber is defined in part by the second portion of the second surface on which the inlet vent is disposed; and

the first portion of the first surface on which the outlet vent is disposed defines a second air chamber.

14. The standardized peripheral apparatus of claim 13, wherein the first air flow chamber is flow-coupled to the second air flow chamber.

15. The standardized peripheral apparatus of claim 1, wherein the integrated circuit, the case and the thermal management arrangement form a PC Card.

16. The standardized peripheral apparatus of claim 15, wherein the PC Card is a selected one of a data storage device and a communication interface adapter.

17. A standardized peripheral apparatus comprising:

an integrated circuit;

a case encasing the integrated circuit, the case having

an outlet vent disposed on a first portion of a first surface of the case to facilitate exhaust of heat generated by the integrated circuit, into ambient; and

an inlet vent disposed on a second portion of a second surface of the case, to facilitate an intake of air from the ambient;

a flow generating device disposed inside the case, to at least facilitate an air flow over the integrated circuit in a general direction from the inlet vent to the outlet vent; and

a connector, to directly couple the apparatus to a host device in a substantially rigid relationship.

18. The standardized peripheral apparatus of claim 17, wherein the first and second surfaces are of the same surface.

19. The standardized peripheral apparatus of claim 18, wherein the flow generating device is positioned substantially near the inlet vent.

20. The standardized peripheral apparatus of claim 19, wherein the flow generating device includes a synthetic jet actuator.

21. The standardized peripheral apparatus of claim 20, wherein the synthetic jet actuator is a selected one of a piezoelectric type and an electromagnetic type.

22. The standardized peripheral apparatus of claim 21, wherein the synthetic jet actuator operates on input powers substantially between 10 and 50 milliwatts.

23. The standardized peripheral apparatus of claim 19, wherein the connector comprises a selected one of a 32-bit Cardbus connector and a universal serial bus connector.

24. A method comprising:

operating an integrated circuit, housed inside of a case having a form factor including a plurality of external dimensions in compliance with a standard having a plurality of specifications governing the form factor and the external dimensions but not providing for thermal management arrangement, leading to heat being sourced from the integrated circuit;

providing a suitable thermal environment for the integrated circuit by, at least in part, modifying or augmenting the case without causing the case to cease to comply with the standard's form factor and external dimension specifications.

25. The method of claim 24, wherein modifying or augmenting the case includes providing an inlet vent to introduce air from an ambient into the interior of the case;

providing an outlet vent to exhaust at least a portion of air from the interior of the case to the ambient.

26. The method of claim 25, wherein providing a suitable thermal environment further comprises

flowing air over the integrated circuit in a general direction from the inlet vent to an outlet vent, the flowing of air facilitated by at least a flow generating device.

27. The method of claim 26, wherein the flow generating device comprises a synthetic jet actuator.

28. A system comprising:

a host device;

a standardized peripheral device including

electronic circuitry including an integrated circuit;

a case encasing the electronic circuitry, the case having a form factor including a plurality of external dimensions in compliance with a standard having a plurality of specifications governing the form factor and the external dimensions but not providing for thermal management arrangement; and

a thermal management arrangement to either modify or augment the case to provide a suitable thermal environment for the integrated circuit without causing the case to cease to comply with the standard's form factor and external dimension specifications; and

a connector, to couple the standardized peripheral device to the host device.

29. The system of claim 28, wherein the thermal management arrangement comprises

an outlet vent, disposed on a first portion of the case, to facilitate an exhaust of heat generated by the integrated circuit into an ambient;

an inlet vent, disposed on a second portion of the case, to facilitate an intake of air from the ambient; and

a flow generating device disposed inside the case using available space, to at least facilitate an air flow over the integrated circuit.

30. The system of claim 29, wherein the flow generating device is a selected one of a piezoelectric synthetic jet actuator and an electromagnetic jet actuator.

31. The system of claim 28, wherein the electronic circuitry includes a selected one of a data storage device and a communication interface adapter.

32. The system of claim 28, wherein the host device is a selected one of a set-top box, a mobile phone, a digital camera, and a personal digital assistant.

33. The system of claim 28, wherein the connector comprises a selected one of a 32-bit Cardbus connector and a universal serial bus connector.